

# *Eosipho zephyrus*, a new species (Gastropoda: Buccinidae) from deep water off Chile

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## ABSTRACT

*Eosipho zephyrus*, a new deep-water species from off the Chilean coast is described. Protoconch morphology distinguishes the new species from *Cantharus aldermenensis* Powell, 1971, a species commonly placed in the genus *Eosipho* Thiele, 1929. It is the first record of a member of the “*Eosipho aldermenensis* group” in the eastern Pacific. Generic allocation in *Eosipho* Thiele, 1929 versus in *Manaria* Smith, 1906 is briefly discussed. The presence of a third cusp on the lateral teeth of the radula is observed, compared to the same phenomenon in *Manaria* Smith, 1906 and *Colus* Röding, 1786, and considered to be an atypical morphology within the group rather than a feature warranting additional taxonomic separation.

*Additional keywords:* *Manaria*, radula, variability, biodiversity, Eastern Pacific

## INTRODUCTION

The coastal zone of north to south-central Chile, strongly influenced by wind-driven upwelling, is one of the areas with the highest known primary production rates in the world (Daneri et al., 2000). Consequently, this area of the southeastern Pacific Ocean harbors a vast pelagic and benthic biomass. However, in spite of proof that the benthic fauna is rich in endemic species, many species are still unstudied, undescribed, or unknown. For a brief history and overview of past and recent expeditions and malacological investigations offshore the Chilean coast we refer to Fraussen and Sellanes (2008: 97).

Fraussen and Sellanes (2008) treated some deep-water species of the genus *Aeneator* Finlay, 1927 and a species from the Concepción Methane Scape area (or CMSA) belonging to the genus *Kryptos* Jeffreys in Dautzenberg and Fischer, 1896. The goal of this second paper is to continue adding to the knowledge of the Buccinidae from off Chile with the description of a new species and

interpreting it in a wider context by comparing with Indo-West Pacific relatives. It belongs to what we call the “*Eosipho aldermenensis* group”. Species belonging to, or assigned to, *Eosipho* are known from the western Atlantic and from the Indo-West Pacific; the *Eosipho aldermenensis* group, however, was until now known only from the Indo-West Pacific. The present new species is the first member of the genus known to occur in the eastern Pacific.

Tropical deep-water Buccinidae are taxonomically a rather puzzling group, not the least the species belonging to *Eosipho* Thiele, 1929 and *Manaria* Smith, 1906. Both genera are very similar and it is still a question whether *Cantharus aldermenensis* Powell, 1971 and related species, including the new species described herein, belongs to *Eosipho* or to *Manaria*. We follow the opinion of Bouchet and Warén (1986: 466, 469), retaining this species tentatively in the genus *Eosipho*. Strong evidence exists that the *Eosipho aldermenensis* group may consist of more than one species (Fraussen and Stahlschmidt, unpublished), and the description of the present new species is a first step towards answering this question.

## ABBREVIATIONS

JS: collection of Javier Sellanes, Chile; KBIN: Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium; KF: collection of Koen Fraussen, Belgium; MNHN: Muséum national d’Histoire naturelle, Paris, France; MNHNCL: Museo Nacional de Historia Natural, Santiago, Chile; PS: collection of Peter Stahlschmidt, Rohrbach, Germany; lv: live collected specimen; dd: empty shell.

## SYSTEMATICS

Class Gastropoda Cuvier, 1797  
Order Neogastropoda Wenz, 1938  
Subfamily Buccinoidea Rafinesque, 1815

Family **Buccinidae Rafinesque, 1815**

Genus ***Eosipho* Thiele, 1929**

**Type Species:** *Chrysodomus (Sipho) smithi* Schepman, 1911 (by original designation) (type locality: Indonesia, north of Pulau Talisei, Celebes Sea, 01°58' N, 125°00' E, 1165–1264 m, Siboga stn 122).

**Remarks:** Members of the genus *Eosipho* mainly live in the Indo-West Pacific, with species known from the Mozambique Channel in the west, along Indonesia to the Philippines in the east, from Japan in the north to New Zealand in the south. *Eosipho smithi* (Schepman, 1911) and *Eosipho aldermenensis* (Powell, 1971) are both widespread species. The latter was tentatively placed in this genus by Bouchet and Warén (1986: 469) because of conchological affinities. In the present paper we follow this opinion. Further study (Fraussen and Stahlschmidt, unpublished) may involve the placement of *Eosipho aldermenensis* in the genus *Manaria* Smith, 1906 (type species: *Manaria thurstoni* Smith, 1906, by original designation, from “Gulf of Manar”, India). More species with conchological characteristics similar to *Eosipho* were included by Shikama (1977: 16, *pygmaeus*), Bouchet and Warén (1986: 467–469, *coriolis*, *engouia*, *thorybopus*), Okutani and Iwahori (1992: 149–250, *tosaensis*), Fraussen (2001: 1–5, *poppei*) and Fraussen and Hadorn (2005: 107–109, *atlanticus*) as well as members from hydrothermal vents (Okutani and Ohta, 1993: 217–218, *desbruyeresi*; Warén and Bouchet, 2001: 191, *anzendai*).

***Eosipho zephyrus* new species**

(Figures 1–10, 13–14, 17–21)

**Description:** Shell small for genus (up to 11.7 mm), thin, rather fragile, snow white. Shape broad with short spire, whorls convex, suture distinct. Teleoconch consisting of 4 convex whorls with distinct suture. Protoconch consisting of 1 1/2 glossy, rather convex whorls, tip small, whorls rapidly increasing, last whorl rather inflated, resulting in a flattened protoconch. First teleoconch whorl with 6 broad spiral cords, interspaces of fine but deep lines. Second whorl with 8, penultimate whorl with 10 or 11, broad, flat spiral cords; subsutural spiral cords slightly narrower than abapical ones. Body whorl with 22 spiral cords, 3 or 4 cords on siphonal canal; adapical interspaces fine, abapical interspaces gradually becoming broader; interspaces on base half as broad as spiral cords. Last half of body whorl occasionally smooth above periphery (paratype 2, Figures 3, 4) or entirely smooth (paratype 4, Figures 9, 10), but possibly with some traces of interspaces visible near suture.

First teleoconch whorl with 22, second whorl with 27, fine, slightly curved axial ribs, subsuturally rather weak, abapically gradually becoming stronger; interspaces shallow, rather broad. Penultimate whorl with 18 (paratype 5) to 28 (paratype 2), body whorl with 25–27 such axial

cords, gradually becoming weaker, last part of body whorl almost smooth. Aperture oval, columella smooth, glossy, slightly curved; outer lip thin, simple, edge sharp. Siphonal canal short, broad, open.

Operculum (Figure 8) small, thin, transparent, yellowish brown, elongate; nucleus terminal, tip sharp.

Radula (Figures 19–21) typically buccinid. Central tooth tricuspid with rather rectangular base. Lateral teeth variable, atypical of genus, principally bicuspid but with a small additional intermediate cusp.

**Type Material:** Holotype (MNHCL 6677) (10.5 mm), southern Chile, off Chiloé, about 42°S, in 500 m, dd; Paratype 1 (MNHCL 6678) (11.7 mm), same locality as holotype, dd; paratype 2 (KF 5442) (10.5 mm), same locality as holotype, dd. Paratypes 3–4 (MNHCL 6679–6680) (9.8–10.7 mm), Chile, off Concepción, ‘Antarctic Intermediate Water’ Cruise, R/V *Vidal Gormáz*, 36°24.12' S, 73°36.44' W, in 606 m, lv; paratype 5 (KF 5443) (9.7 mm), same locality as paratypes 3 and 4; paratype 6 (MNH 24775) (11.8 mm), southern Chile, off Taitao peninsula, INSPIRE Cruise, R/V *Melville*, 46°54.15' S, 75°35.99' W, in 497 m, lv; paratype 7 (PS 150133) (11.0 mm), same locality as paratype 6, lv; paratypes 8–10 (KF 6579–6581) (10.7–12.2 mm), same locality as paratype 6, 2 lv, 1 dd; paratype 11 (KBIN) (11.5 mm), same locality as paratype 6, lv; paratypes 12–28 (JS) (8.8–13.2 mm), same locality as paratype 6, 16 lv, 1 dd.

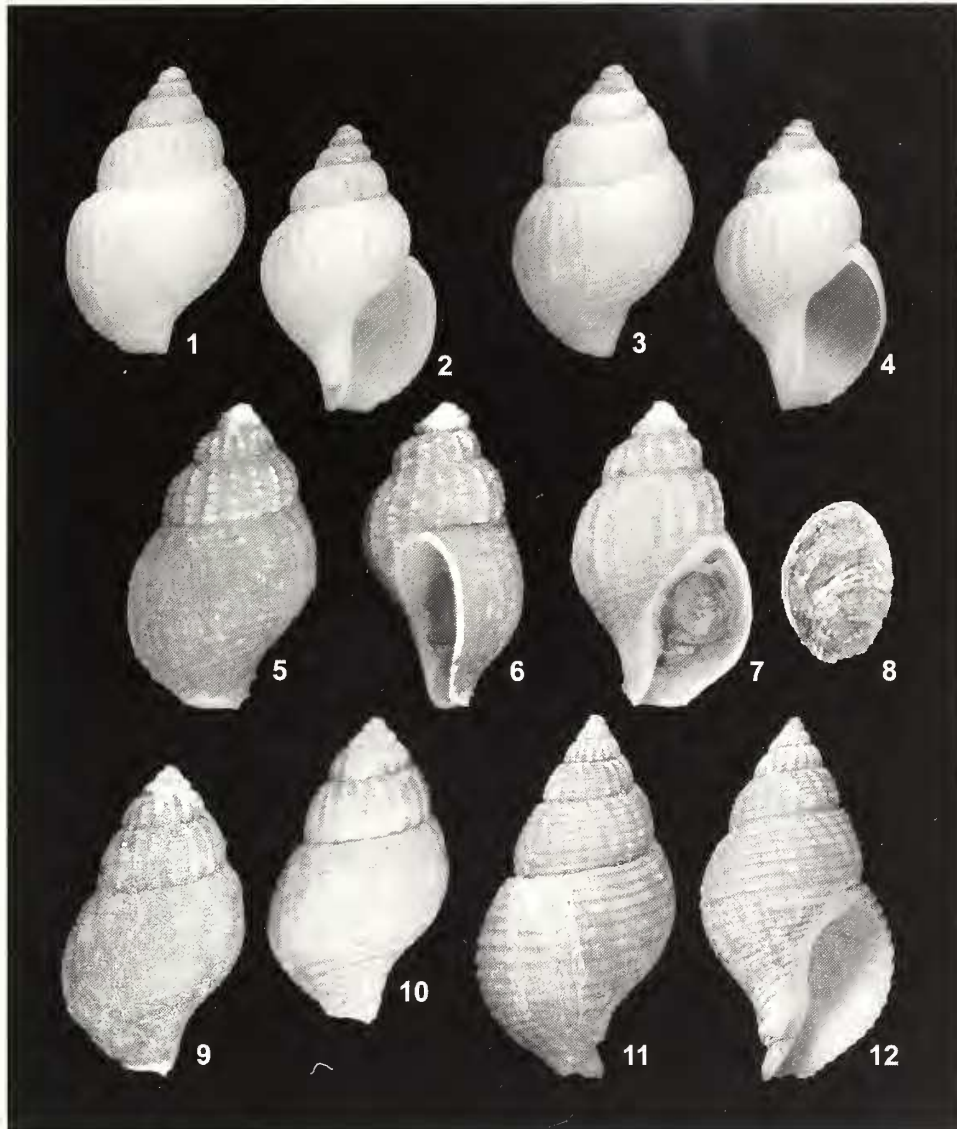
**Type Locality:** Southern Chile, off Chiloé, around 42° S, upper continental slope, in 500 m.

**Range and Habitat:** Only known from the type material. Detailed habitat data are not available, but two of the sites (off Concepción and Taitao peninsula), in which the specimens were collected, have been identified as methane seep areas. Live collected shells are covered with a thick, unidentified sponge-like mass (Figures 9, 17–18).

**Etymology:** *Eosipho zephyrus* new species is named after the Greek god for the west wind *Zephyrus*, a name used as a noun in apposition. The name is an allusion to the easternmost occurrence of this species, far from the ranges of the other congeneric species in the Indo-West Pacific, as if it were blown to the east by the wind.

**Comparative Remarks:** *Eosipho zephyrus* new species is characterized by the broad shape with moderately short spire, the convex teleoconch whorls, the weak spiral sculpture consisting of flat cords and narrow interspaces, the broad and blunt protoconch with rapidly increasing whorl size, greenish and rather smooth periostracum and small adult size.

*Eosipho zephyrus* new species is variable in presence of spiral sculpture (present or absent on the adapical part of the body whorl) and in number of axial ribs (18 to 28 ribs on penultimate whorl).



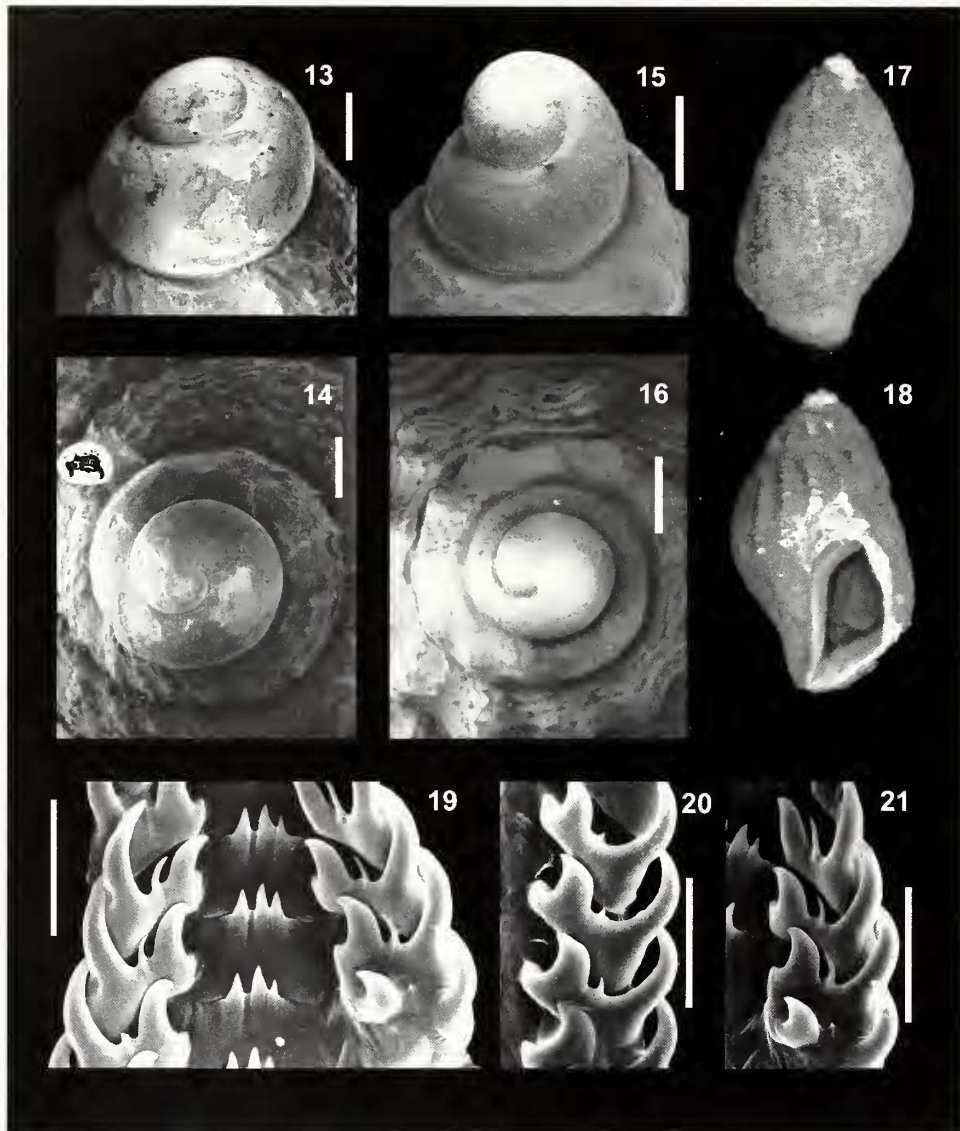
**Figures 1–12.** *Eosipho* species. 1–10. *Eosipho zephyrus* new species. 1–2. Holotype, 10.5 mm, Chile, Chilean upper continental slope, in 500 m, MNHNCL 6677. 3–4. Paratype 2, 10.5 mm, same locality, KF 5442. 5–7. Paratype 5, 9.7 mm, Chile, off Concepción, AIW Cruise, 36°24.12' S, 73°36.44' W, in 606 m, KF 5443. 8. Operculum of paratype 5, 2.2 mm, KF 5443. 9. Paratype 4, 10.7 mm, same locality, MNHNCL 6680. 10. Same shell, cleaned. 11–12. *Eosipho aldermenensis* (Powell, 1971), 16.8 mm, East China Sea, off China, in 280–380 m, KF 5244.

The protoconch (Figure 13, 14) is quite atypical of both *Eosipho* Schepman, 1911 and *Manaria* Smith, 1906. While species belonging to these genera have a protoconch consisting of gradually larger, convex whorls (Figure 15, 16), the new species differs in having a bigger last whorl and a flattened appearance.

The radula of *Eosipho zephyrus* new species is atypical of Cominellinae (containing both *Eosipho* Schepman, 1911 and *Manaria* Smith, 1906) by the presence of a third cusp on the lateral teeth (Figures 19–21). This additional cusp is usually small to minute and appears to be an additional rather than a constant presence. Variability in number of rachidian cusps within a single genus

is not unusual in Buccinidae: *Neptunca* Röding, 1798 with 3–7 lateral cusps (Golikov 1964: 17, 29–33; Fraussen and Terry, 2007: 21, 39, 64), *Buccinum* Linnaeus, 1758 with 2–6 lateral cusps (Golikov 1980: 54, 99–104), *Prosipho* Thiele, 1912 with 2–6 lateral cusps (Powell, 1951: 193; Oliver and Picken, 1984: 96; Dell, 1990: 187). The presence of an additional median cusp in Cominellinae is known in *Manaria lirata* Kuroda and Habe in Habe, 1961 (Fraussen and Stahlschmidt, unpublished) and in Buccinulinae in *Drepanodontus* Harasewych and Kantor, 2004 (Harasewych and Kantor, 2004: 7, 12, figs. 36–40).

*Eosipho aldermenensis* (Powell, 1971) (type locality: “E. of the Aldermen Islands, New Zealand, 366–475 m”)



**Figures 13–21.** *Eosipho* species. **13–14.** *Eosipho zephyrus* new species, protoconch of holotype, scale bar = 300 micrometer, MNHNCL 5866. **15–16.** *Eosipho aldermenensis* (Powell, 1971). Vanuatu (BOA O expedition, station CP2319), MNHN. Scale bar = 300  $\mu$ m. **17–21.** *Eosipho zephyrus* new species. **17–18.** Paratype 3, 9.8 mm, Chile, off Concepción, RIW Cruise, 36°24.12' S, 73°36'44 W, in 606 m, MNHNCL 6679. **19–21.** Radula of holotype. Scale bar = 40  $\mu$ m.

(Figures 11–12, 15–16), a widespread species in the Indo-West Pacific, differs in having a smaller protoconch compared to shell length, broader spiral cords with broader interspaces, a lower number of axial ribs and a larger adult size. Some evidence may exist (Fraussen and Stahlschmidt, unpublished) that several Indo-West Pacific records assigned to *Eosipho aldermenensis* belong to distinct species. A thorough study of this complex is beyond the scope of the present paper, and we hereby tentatively regard “*aldermenensis*” as a group and we use this name for the Indo-West Pacific species.

*Manaria brevicaudata* (Schepman, 1911) (type locality: Borneo, north off Kagayan de Sulu Island, Flores Sea, SIBOGA stn. 45, 07°24' S, 118°15' E,

794 m) is similar in spiral sculpture (fine spiral grooves), in variability (absence or presence of spiral sculpture on the adapical part of the body whorl) and periostracum (greenish and smooth) but differs in having a slender shape with a high spire, a slightly longer siphonal canal, a lower number of axial ribs and a larger adult size. The protoconch of *Manaria brevicaudata* is unknown, all specimens studied by us have eroded protoconch.

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#### LITERATURE CITED

- Bouchet, P. and A. Warén. 1986. Mollusca Gastropoda: Taxonomical notes on tropical deep water Buccinidae with descriptions of new taxa. Résultats des Campagnes MUSORSTOM. I & II. Philippines, tome 2. Mémoires du Museum national d'Histoire naturelle, 1985, série A, Zoologie 133: 457–499.
- Daneri, G., V. Dellarossa, R. Quiñones, B. Jacob, P. Montero, and O. Ulloa. 2000. Primary production and community respiration in the Humboldt Current System off Chile and associated oceanic areas. Marine Ecology-Progress Series 197: 41–49.
- Dell, R.K. 1990. Antarctic Mollusca, with special reference to the fauna of the Ross Sea. The Royal Society of New Zealand, Bulletin 27: 1–311.
- Fraussen, K. 2001. A new *Eosipho* (Gastropoda: Buccinidae) from the Philippine Islands. Gloria Maris 39 (5–6): 90–97.
- Fraussen, K. and R. Hadorn. 2005. A new species of *Eosipho* (Gastropoda: Buccinidae) from Guadeloupe, Western Atlantic. Novapex 6: 107–109.
- Fraussen, K. and J. Sellanes. 2008. Three New Buccinid Species (Gastropoda: Neogastropoda) from Chilean Deep-Water, Including One from a Menthane Seep. The Veliger 50: 97–106.
- Fraussen, K. and Y. Terry. 2007. The Family Buccinidae: Genus *Neptunea*. In: G. T. Poppe and K. Groh (eds.) A Conchological Iconography. ConchBooks, Hackenheim, 166 pp., 154 pl.
- Golikov, A.N. 1963. Gastropod mollusks of the Genus *Neptunea* Bolten. Fauna of the USSR, Mollusks. USSR Academy of Science 5(1): 1–183.
- Golikov, A.N. 1980. Buccininae mollusks of the World Ocean. Fauna of the USSR, Mollusks. USSR Academy of Science 5(2): 1–465.
- Habe, T. 1961. Coloured illustrations of the shells of Japan. 2. Hoikusha, Osaka, 183 pp.
- Harasewych, M.G. and Y.I. Kantor. 2004. The deep-sea Buccinoidea (Gastropoda: Neogastropoda) of the Scotia Sea and adjacent abyssal plains and trenches. The Nautilus 118: 1–42.
- Okutani, T. and A. Iwahori. 1992. Noteworthy gastropods collected from bathyal zone in Tosa Bay by the R/V KOTAKA-MARU in 1987 and 1988. Venus 51: 235–268.
- Okutani, T. and S. Ohta. 1993. New buccinid and turrid gastropods from North Fiji and Lau basins. Venus 52: 217–221.
- Oliver, P.G. and G. Picken. 1984. Prosobranch gastropods from Signy Island, Antarctica: Buccinacea and Muricacea. British Antarctic Survey, Bulletin 62: 95–115.
- Powell, A.W.B. 1951. Antarctic and Subantarctic Mollusca: Pelecypoda and Gastropoda. Discovery Reports 26: 47–196.
- Powell, A.W.B. 1971. New Zealand molluscan systematics with descriptions of new species: part 7. Records of the Auckland Institute and Museum 8: 209–228.
- Powell, A.W.B. 1979. New Zealand Mollusca. Marine, Land and Freshwater Shells. Auckland Institute and Museum, Collins, Australia, 474 pp.
- Röding, P.F. 1798. Museum Boltenianum sive catalogus cimeliorum e tribus regnis naturæ quæ olim collegerat Joa. Fried. Bolten, M. D. p. d. per XL. annos proto physicus Hamburgensis. Pars secunda continens conchyliam sive testacea univalvia, bivalvia & multivalvia. 1–199 pp.
- Schepman, M.M. 1911. Prosobranchia of the Siboga Expedition. Part 4: Rachiglossa. Siboga Expeditie: 247–364.
- Shikama, T. 1977. Description of new and noteworthy Gastropoda from Western Pacific and Indian Oceans. Science Reports of Yokohama National University (sect. 2) 24: 9–24.
- Smith, E.A. 1906. Natural history notes from R.I.M.S. 'Investigator'. Series 3 (10). On Mollusca from the Bay of Bengal and the Arabian Sea. The Annals and Magazine of Natural History (serie 7) 18(105): 157–175.
- Thiele, J. 1912. Die antarktischen Schnecken und Muscheln. Deutsche Südpolar-Expedition 1901–1903 (13): 183–285.
- Thiele, J. 1929. Handbuch der Systematischen Weichtierkunde. Gustav Fischer, Jena, 376 pp.
- Warén, A. and P. Bouchet. 2001. Gastropoda and Monoplacophora from hydrothermal vents and seeps: new taxa and records. The Veliger 44: 116–231.